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IN REPLY
REFER TO

DSCC-VAT

17 June 2004

MEMORANDUM FOR MILITARY/INDUSTRY DISTRIBUTION

SUBJECT: Proposed Drafts of MIL-PRF-39016 Specification Sheets

The initial drafts of the following documents are now available for viewing and downloading from the DSCC-VA Web site:

| Specification Sheet | Project # |
|---------------------|-----------|
| MIL-PRF-39016/7G | 5945-1246 |
| MIL-PRF-39016/8G | 5945-1247 |
| MIL-PRF-39016/9J | 5945-1248 |
| MIL-PRF-39016/10G | 5945-1249 |
| MIL-PRF-39016/11G | 5945-1250 |
| MIL-PRF-39016/12G | 5945-1251 |
| MIL-PRF-39016/13J | 5945-1252 |
| MIL-PRF-39016/15K | 5945-1253 |
| MIL-PRF-39016/16G | 5945-1254 |
| MIL-PRF-39016/20J | 5945-1255 |
| MIL-PRF-39016/21G | 5945-1256 |

| Specification Sheet | Project # |
|---------------------|-----------|
| MIL-PRF-39016/23F | 5945-1257 |
| MIL-PRF-39016/24F | 5945-1258 |
| MIL-PRF-39016/25F | 5945-1259 |
| MIL-PRF-39016/26F | 5945-1260 |
| MIL-PRF-39016/27F | 5945-1261 |
| MIL-PRF-39016/28F | 5945-1262 |
| MIL-PRF-39016/29G | 5945-1263 |
| MIL-PRF-39016/30F | 5945-1264 |
| MIL-PRF-39016/35C | 5945-1265 |
| MIL-PRF-39016/41E | 5945-1266 |
| MIL-PRF-39016/43E | 5945-1267 |

<http://www.dsccols.com/Programs/MilSpec>

or

<http://www.dscc.dla.mil/Programs/MilSpec/DocSearch.asp>

The proposed drafts of the documents are forwarded for your review and comment. The proposed changes reflect updates as required by MIL-STD-961, standardizing the terminology for the mounting pads, deletion of the particle impact noise (PIND), incorporation of previous amendments, and correcting editorial errors.

If these documents are of interest to you, please submit your typed comments or suggestions using electronic mail or by letter. Comments may be resubmitted if it is believed that insufficient consideration has been given to previous comments. Please provide additional justification for these items. Comments or suggested changes that are not editorial in nature should include justification. Industrial activities should indicate whether they are commenting from the standpoint of a "User" or "Manufacturer." Military review activities should forward comments to their custodians in sufficient time to allow for consolidating the departmental reply. All Navy review activities are requested to send their comments to this center in lieu of the Navy - EC custodian. All agencies, industry, and coordinated custodian comments should be sent to this center. Comments originating from the military departments must be identified as either "Essential" or "Suggested." Essential comments, which must be accepted or withdrawn, should be supported by test data unless they obviously require no data.

Comments should be returned to this Center no later than 45 days from the date of this letter. If no response is received by the specified date, it is assumed that you concur with the document. Any further coordination concerning this document will be circulated only to firms and organizations that furnish comments or reply that they have an interest.



If there are any questions, please contact Mr. Jim Crum, by electronic mail at james.crum@dla.mil (preferred method of notification); by telephone at commercial 614-692-0542, DSN 850-0542; by facsimile 614-692-6939; or by mail at Defense Supply Center Columbus, Electronic Components Team, DSCC-VAT, P.O. Box 3990, Columbus, OH 43216-5000.

Signature on File

KENDALL A. COTTONGIM
Chief
Electronic Components Team

22 Attachments

**NOTE: This draft, dated 17 June, 2004 prepared by DLA-CC has not been approved and is subject to modification.
DO NOT USE FOR ACQUISITION PURPOSES. (Project 5945-1256)**

INCH-POUND

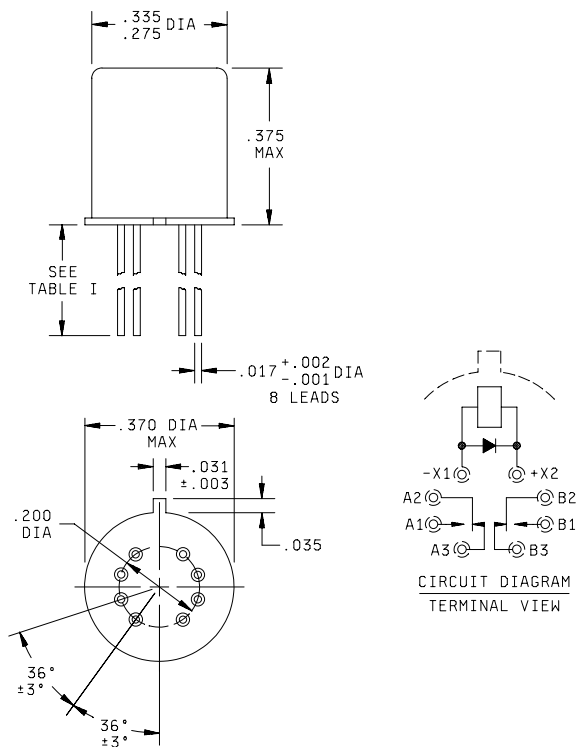
MIL-PRF-39016/21G
DRAFT
SUPERSEDING
MIL-PRF-39016/21F
20 July 1988

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, DPDT, LOW LEVEL
TO 1.0 AMPERE (SENSITIVE 60 MILLIWATTS) WITH INTERNAL DIODES FOR COIL
TRANSIENT SUPPRESSION AND POLARITY REVERSAL PROTECTION

This specification sheet is approved for use by all Departments
and Agencies of the Department of Defense.

The complete requirements for acquiring the relays described herein shall
consist of this specification sheet and the latest issue of MIL-PRF-39016.

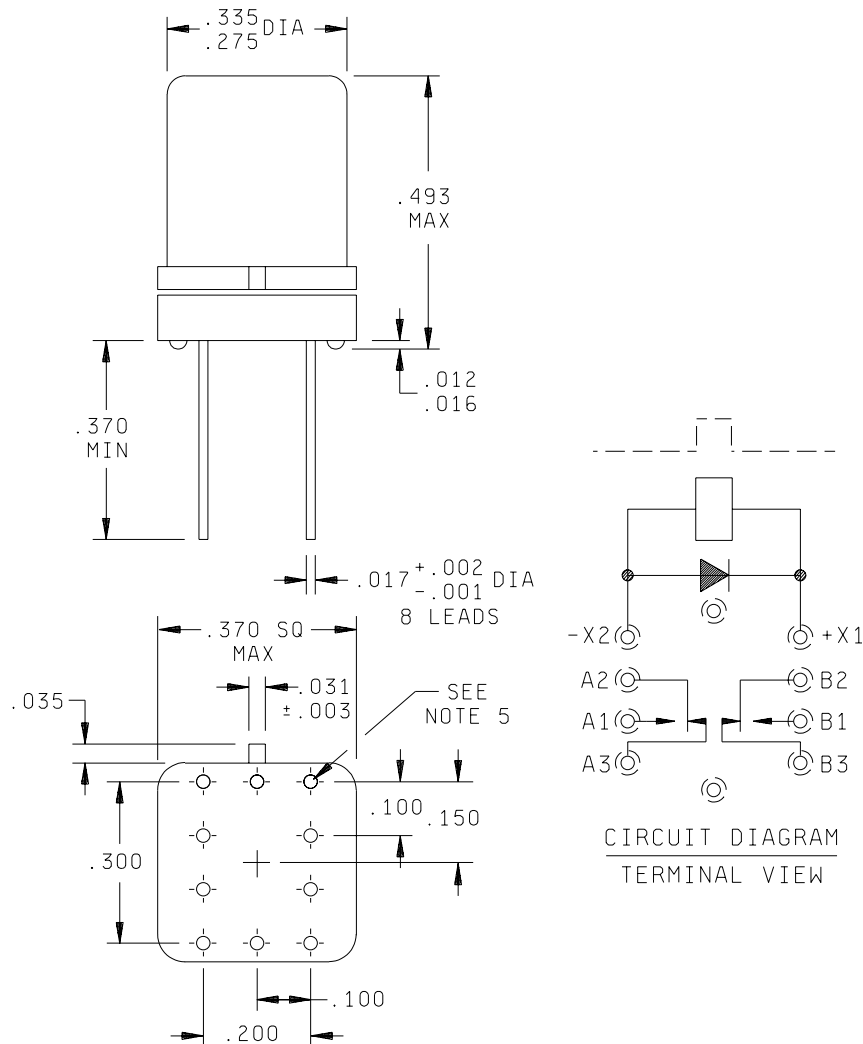


| Inches | mm |
|--------|------|
| .001 | 0.03 |
| .002 | 0.05 |
| .003 | 0.08 |
| .017 | 0.43 |
| .031 | 0.79 |
| .035 | 0.89 |
| .200 | 5.09 |
| .275 | 6.99 |
| .335 | 8.51 |
| .370 | 9.40 |
| .375 | 9.53 |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is $\pm .010$ (0.25 mm).
4. Terminal numbers shown above are for reference only. Numbers do not appear on the relay.
5. Relays shall have a plus (+) sign placed on the circuit diagram as shown.
6. Coil symbol optional in accordance with MIL-STD-1285.
7. Circuit diagram shown on part is the terminal view.

FIGURE 1. Dimensions and configuration.



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is $\pm .010$ (0.25 mm).
4. Spreader mounting pads shall comply with the requirements of A-A-55485, A-55485/05-003.
5. Dimensions and tolerances shown for the bottom view of the spreader mounting pad are for the center-to-center locations of the holes in the spreader mounting pad.
6. Shape optional within envelope dimension.
7. Terminal numbers shown above for reference only. Numbers do not appear on relay.
8. Relays shall have a plus (+) sign placed on the circuit diagram as shown.
9. Coil symbol optional in accordance with MIL-STD-1285.
10. Circuit diagram shown on part is the terminal view.

| Inches | mm |
|--------|-------|
| .001 | 0.03 |
| .002 | 0.05 |
| .003 | 0.08 |
| .012 | 0.30 |
| .016 | 0.41 |
| .017 | 0.43 |
| .031 | 0.79 |
| .035 | 0.89 |
| .100 | 2.54 |
| .150 | 3.81 |
| .200 | 5.08 |
| .275 | 6.99 |
| .300 | 7.62 |
| .335 | 8.51 |
| .370 | 9.40 |
| .493 | 12.52 |

FIGURE 2. Dimensions and configuration relay supplied with spreader mounting pad attached.

REQUIREMENTS:

CONTACT DATA:

Load ratings:

High level (relay case grounded):

Resistive:

1.0 ampere at 28 V dc.

250 milliamperes at 115 V ac 60 and 400 Hz case not grounded.

100 milliamperes at 115 V ac 60 and 400 Hz case grounded.

Inductive load: 0.2 ampere at 28 V dc with 0.32 henry inductance.

Lamp: 0.10 ampere at 28 V dc.

Low level: 10 to 50 μ A at 10 to 50 mV dc or peak ac.

Intermediate current: Applicable.

Contact resistance or voltage drop:

Initial: 0.10 ohm maximum (0.125 ohm maximum with spreader mounting pad attached).

High level:

During life: Not more than 5 percent of open circuit voltage.

After life: 0.20 ohm maximum (0.225 ohm maximum with spreader mounting pad attached).

Low level:

During life: 33 ohms maximum.

After life: 0.15 ohm maximum (0.175 ohm maximum with spreader mounting pad attached).

Intermediate current:

During: 1 ohm maximum.

After: 0.20 ohm maximum (0.225 ohm maximum with spreader mounting pad attached).

Contact bounce: 1.5 milliseconds maximum (applicable to failure rate level "L").

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Contact stabilization time: 2.0 milliseconds maximum (applicable to failure rate levels "M", "P", and "R").

Overload (high level only): Two times rated current. Not applicable to ac load ratings.

COIL DATA: See table I.

Operate time: 4.0 ms maximum over temperature range with rated coil voltage.

Release time: 7.5 ms maximum over temperature range.

ELECTRICAL DATA:

Insulation resistance: 10,000 megohms minimum at 500 V dc, except the resistance between coil and case at high temperature shall be 1,000 megohms minimum.

Dielectric withstanding voltage:

| | Sea level V rms (60 Hz) | Post Intermediate current life test Sea level V rms (60 Hz) | Altitude V rms (60 Hz) |
|--|-------------------------------|---|---------------------------------|
| Between case, frame, or enclosure and all contacts in the energized and de-energized positions. | 500 | 500 | 125 All terminals to case |
| Between case, frame, or enclosure and coils. | 500 | 500 | |
| Between all contacts and coils. | 500 | 500 | |
| Between open contacts in the energized and de- energized positions. | 500 | 375 | |
| Between contact poles. | 500 | 500 | |
| Between coils of dual coil relays. | N/A | N/A | |

DIODE CHARACTERISTICS

Coil transient suppression: Applicable.

Diode block integrity (perform this test after coil transient suppression test in all inspection tables of MIL-PRF-39016): With applicable voltage applied to the relay coil circuit in the reverse direction, monitor leakage current with dc microammeter, oscilloscope, or qualifying activity approved test equipment. Leakage current shall not exceed the specified value.

Block integrity maximum leakage current: 1 μ A at 50 V dc.

Maximum negative transient: 1.0 volt.

Breakdown voltage: 100 V dc minimum at 10 microamperes (μ A). (This test may be performed in-process or as final assembly).

Semiconductor in-process screening: Applicable, visual inspection of semiconductors shall be in accordance with MIL-STD-750, method 2073 or 2074.

ENVIRONMENTAL DATA:

Temperature range: -65°C to +125°C.

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Vibration (sinusoidal): MIL-STD-202, method 204. Contact chatter shall not exceed 10 microseconds maximum for closed contacts, and 1 microsecond maximum closure for open contacts.

Vibration (random): MIL-STD-202, method 214, test condition IG. Contact chatter shall not exceed 10 microseconds maximum for closed contacts, and 1 microsecond maximum closure for open contacts (applicable to qualification and group C testing only).

Shock (specified pulse): MIL-STD-202, method 213, test condition B (75 g's). Contact chatter shall not exceed 10 microseconds maximum for closed contacts, and 1 microsecond maximum closure for open contacts.

Magnetic interference: Applicable.

Resistance to soldering heat: Applicable.

Acceleration: Applicable.

Salt atmosphere (corrosion): In accordance with method 1041, MIL-STD-750.

PHYSICAL DATA:

Terminal strength: MIL-STD-202, method 211

Pull test: Test condition A, 1 pound pull.

Bend test: Test condition C, ½ pound load.

Twist test: As specified in MIL-PRF-39016.

Solderability: Applicable.

Dimensions and configuration: See figure 1 and 2.

Weight: 4.25 grams (0.15 ounce) maximum, 4.50 grams (0.159 ounce) maximum with spreader mounting pad attached.

Seal: Hermetic.

Minimum marking: Military part number, "J" with the date code (example J0430), circuit diagram, manufacturer's name or source code.

LIFE TEST REQUIREMENTS:

High level: 100,000 cycles per relay.

Low level: 100,000 cycles plus 900,000 cycles mechanical life.

Part or Identifying Number (PIN): M39016/21- (dash number from table I and suffix letter, designating failure rate level).

TABLE I. Dash numbers and characteristics.

| Dash numbers 2/ | | | | Coil voltage (V dc) 5/ | | At 25°C | | | | | | Over temperature range | | |
|--------------------------------------|---------------------------------|-------------------------------|--|---------------------------|------|--|--|------|---|--|--|---|--|--|
| Lead length 1.500 min 3/ | Lead length .187 ±.010 | Lead length .500 min | Spreader mounting pads (fig. 2) 4/ | | | Coil resis- tance (ref. only Ohms | Coil circuit current (mA) 6/ 7/ | | Speci- fied pickup value (volt. (V dc) | Speci- fied hold value (volt.) (V dc) | Speci- fied drop- out value (volt.) (V dc) | Speci- fied pickup value (volt. (V dc) | Speci- fied hold value (volt.) (V dc) | Speci- fied drop- out value (volt.) (V dc) |
| | | | | Rated | Max | | Max | Min | | | | | | |
| 007 | 019 | 033 | 041 | 5.0 | 7.0 | 64 | 78.1 | 56.8 | 2.9 | 2.2 | 0.8 | 3.7 | 2.6 | 0.7 |
| 008 | 020 | 034 | 042 | 6.0 | 10.0 | 125 | 48.9 | 36.3 | 4.0 | 2.5 | 0.9 | 4.8 | 3.0 | 0.8 |
| 009 | 021 | 035 | 043 | 9.0 | 15.0 | 400 | 23.6 | 18.1 | 6.1 | 3.6 | 1.1 | 8.0 | 4.5 | 0.9 |
| 010 | 022 | 036 | 044 | 12.0 | 20.0 | 850 | 15.0 | 11.7 | 7.8 | 4.6 | 1.3 | 11.0 | 5.8 | 1.0 |
| 011 | 023 | 037 | 045 | 18.0 | 30.0 | 1,600 | 12.2 | 9.6 | 11.3 | 7.0 | 1.5 | 14.5 | 9.0 | 1.1 |
| 012 | 024 | 038 | 046 | 26.5 | 40.0 | 3,300 | 8.8 | 7.0 | 15.2 | 10.8 | 1.7 | 19.0 | 13.0 | 1.3 |
| 029 | 031 | 039 | 047 | 36.0 | 57.0 | 6,500 | 6.1 | 4.9 | 21.7 | 14.7 | 2.3 | 27.2 | 19.0 | 1.7 |
| 030 | 032 | 040 | 048 | 48.0 | 75.0 | 11,000 | 4.8 | 3.9 | 27.8 | 19.8 | 2.8 | 34.8 | 26.0 | 2.0 |

- 1/ Each relay possesses high level and low level capabilities. However, relays previously tested or used above 10 mA resistive at 6 V dc maximum or peak ac open circuits not recommended for subsequent use in low level applications.
- 2/ The suffix letter L, M, P, or R to designate the applicable failure rate level shall be added to the applicable listed dash number. Failure rate level (percent per 10,000 cycles): L, 3.0; M, 1.0; P, 0.1; R, 0.01. Example, 007L - - - - -48R.
- 3/ 1.500 leads are inactive for new design.
- 4/ Relays supplied with spreader mounting pads (-041 through -048) shall have the spreader mounting pad rigidly attached.
- 5/ CAUTION: The use of any coil voltage less than the rated coil voltage will compromise the operation of the relay.
- 6/ Coil resistance not directly measurable at relay terminals. When rated voltage is applied to the coil terminals, the coil circuit current must be within the limits shown. Measure at 25°C at nominal voltage for 5 seconds, maximum.
- 7/ Delete "Coil resistance" and substitute "Coil current" test in all inspection tables of MIL-PRF-39016.

QUALIFICATION INSPECTION:

Qualification inspection and sample size: See table II.

TABLE II. Qualification inspection and sample size. 1/

| Single submission | Group submission | |
|--|------------------|--|
| 18 units plus 1 open unit for level L at C = 0 1/ 33 units plus 1 open unit for level M at C = 0 1/ Qualification inspection as applicable | M39016/21-038 | 18 units plus 1 open unit for level L at C = 0 1/ 33 units plus 1 open unit for level M at C = 0 1/ Qualification inspection as applicable |
| | M39016/21-033 | 2 units each PIN |
| | M39016/21-034 | Qualification inspection, Q2. |
| | M39016/21-035 | |
| | M39016/21-036 | |
| | M39016/21-037 | |
| | M39016/21-039 | |
| | M39016/21-040 | |

1/ The number of units required for qualification testing shall be increased as required in Q5, MIL-PRF-39016, if the relay manufacturer elects to test the number of units permitting one or more failures. Prior to performance of qualification testing, the relay manufacturer shall preselect the sampling plan.

Initial qualification of relays supplied with spreader mounting pads (-041 through -048), shall be tested as specified below:

Perform the following tests as specified in the qualification inspection table of MIL-PRF-39016, in the order shown below:

Before installation of spreader mounting pad: Screening, visual and mechanical examination (internal), thermal shock, resistance to solvents, vibration (sinusoidal), vibration (random), shock (specified pulse), acceleration, terminal strength, magnetic interference (when specified), capacitance (when specified), coil life (applicable to continuous duty relays only), resistance to soldering heat, salt spray (corrosion), overload (applicable to high level relays only), life, terminal strength, and intermediate current.

After installation of spreader mounting pad, perform the following tests as specified in the qualification inspection table of MIL-PRF-39016, in the order shown below:

Insulation resistance, dielectric withstanding voltage, static contact resistance, specified pickup, hold, and dropout values (voltage), coil resistance, operate and release time, contact dynamic characteristics, coil transient suppression (when specified), solderability, seal, visual and mechanical inspection (external).

Qualification inspection (reduced testing for previously qualified relays) for relays supplied with spreader mounting pads (-041 through -048), two units of the 26.5 volt rated coil voltage (-046) shall be tested as specified below:

Before installation of spreader mounting pad, perform the following tests as specified in the qualification inspection table of MIL-PRF-39106 in the order shown below:

For failure rate level L only: Screening.

For failure rate levels M, P, and R: Vibration (sinusoidal) test duration shall be 10 minutes, vibration (random), and screening.

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After installation of spreader mounting pad, perform the following tests as specified in the qualification inspection table of MIL-PRF-39016 in the order shown below:

Insulation resistance, dielectric withstanding voltage, static contact resistance, specified pickup, hold, and dropout values (voltages), coil resistance, operate and release time, contact dynamic characteristics, coil transient suppression (when specified), solderability, seal, visual and mechanical inspection (external).

Group A testing for relays supplied with spreader mounting pads (-041 through -048) shall be tested as specified below:

Perform seal test immediately, preceding the A2 electrical tests. Relay leads shall be formed and the spreader mounting pad removed before the seal test. After the seal test, the spreader mounting pad shall be rigidly attached to the relay and the remaining group A tests performed.

SUPERSESSION DATA:

Supersession data: See table III.

TABLE III. Supersession data. 1/

| Superseded part no. M39016/21- | New part no. M39016/21- | Superseded part no. M39016/21- | New part no. M39016/21- |
|--------------------------------------|-------------------------------|--------------------------------------|-------------------------------|
| 001 | 007 | 015 | 021 |
| 002 | 008 | 016 | 022 |
| 003 | 009 | 017 | 023 |
| 004 | 010 | 018 | 024 |
| 005 | 011 | 025 | 029 |
| 006 | 012 | 026 | 030 |
| 013 | 019 | 027 | 031 |
| 014 | 020 | 028 | 032 |

1/ Dash numbers -007 through -012, -029 and -030 are inactive for new design and are for support of existing equipment designs only.

Cross reference for Government logistical support: See table IV.

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TABLE IV. Cross reference for Government logistical support.

| Superseded part no. M39016/21- | New part no. M39016/21- | Support with part no. M39016/21- | | Superseded part no. M39016/21- | New part no. M39016/21- | Support with part no. M39016/21- |
|--------------------------------------|-------------------------------|--|--|--------------------------------------|-------------------------------|--|
| 001 | 007 | 007 | | --- | 033 | 033 |
| 002 | 008 | 008 | | --- | 034 | 034 |
| 003 | 009 | 009 | | --- | 035 | 035 |
| 004 | 010 | 010 | | --- | 036 | 036 |
| 005 | 011 | 011 | | --- | 037 | 037 |
| 006 | 012 | 012 | | --- | 038 | 038 |
| 013 | 019 | 033 | | --- | 039 | 039 |
| 014 | 020 | 034 | | --- | 040 | 040 |
| 015 | 021 | 035 | | --- | 041 | 041 |
| 016 | 022 | 036 | | --- | 042 | 042 |
| 017 | 023 | 037 | | --- | 043 | 043 |
| 018 | 024 | 038 | | --- | 044 | 044 |
| 025 | 029 | 029 | | --- | 045 | 045 |
| 026 | 030 | 030 | | --- | 046 | 046 |
| 027 | 031 | 039 | | --- | 047 | 047 |
| 028 | 032 | 040 | | --- | 048 | 048 |

Referenced documents. In addition to MIL-PRF-39016, this document references the following:

A-A-55485, /5
MIL-STD-202
MIL-STD-750
MIL-STD-1285

Changes from previous issue: Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

Review activities:
Army - AR
Navy - AS, MC, OS, SH
Air Force - 99

(Project 5945-1256)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://www.dodssp.daps.mil>.